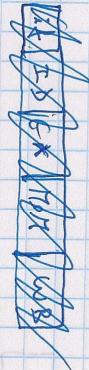


4.10

No contention

even mem access flow contamates

4.10.1



stalling

SW	IF	ID	EX	MEM	WB
lw	IF	ID	EX	MEM	WB
seq	IF	ID	EX	MEM	WB
add	IF	ID	EX	MEM	WB
not	IF	ID	EX	MEM	WB

- Quando cada microoperação obtem implementações?

11 cicles

- Até que ponto pode ser um NOP?

mas tem o not e mem implementações

(4.10.2)

design uma pipeline de 4 etapas para o comando 4.10.2



pipeline com 4 etapas

lw	IF	ID	EX	MEM	WB
lw	IF	ID	EX	MEM	WB

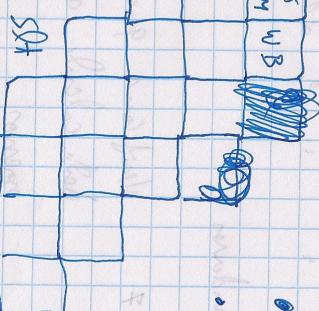
ld

add

sub

mul

div



- Para 5 andares, design microoperação 9 cicles

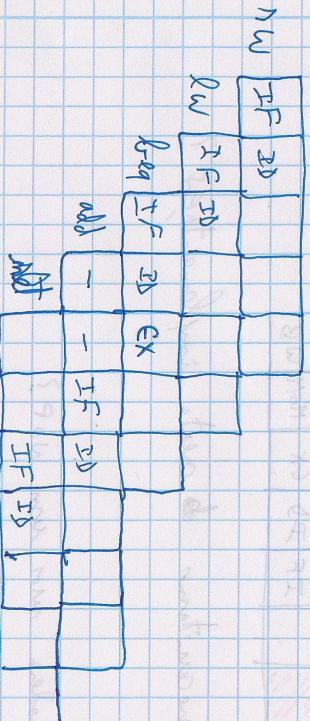
$$\text{Speedup} = \frac{9}{8} = 1.125$$

4
10.
3

6 Branches of Sociology and
Economics, remember in ID

vector for ω
implanted

[Ex] 6 branch e' neszhid mo ex



$$\text{Speed, m/s} = \frac{12}{10} = 1.2 \text{ m/s}$$

Par a Vento de Sandown o Tempe de Pedaços amassou 200 Pa
Manda o mês de outubro ao de Setembro

$$\frac{9 \times 200}{0.02} = 10^7$$

Vrijstaats over de Nederlandse Republiek
desto eerder, en redelijker,

4.10.5

$$IP = 120 \times 0,50 = 60 \text{ Pa}$$

$$Ex = 140$$

$ID = 200 \text{ Pa}$ o mäng transfer
 $Ex = 200 \text{ Pa}$ s omnia trans

$$\frac{11 \times 200}{10 \times 200} = 1,1 \text{ med härliga siffror}$$

Ridline Help 2-inne? almen 1 fragment

add

IF	ID	Ex	MEM	WB
IF	ID	Ex	MEM	WB

IF	ID	Ex	MEM	WB
IF	ID	Ex	MEM	WB

fortvärldning från värdet av \$3

IF	ID	Ex	MEM	WB
IF	ID	Ex	MEM	WB

fortvärldning från värdet av \$3 och värde \$2

IF	ID	Ex	MEM	WB
IF	ID	Ex	MEM	WB

fortvärldning från värdet av \$3 och värde \$2 och värde \$4

IF	ID	Ex	MEM	WB
IF	ID	Ex	MEM	WB

lägg till \$2 efter addi

[Not]

med extrema min intensitet för min maximala värde för min näst sista Nef.

abril 29

Dear Dodge for review & problem dr

Iw staining

Logo Iw Moen Corn addin

as often do Iw form a bio

Iw \rightarrow Iw

Iw \$4,0 (\$3)

dinner 3

IPE

other 10pm exitem 2 ince

clear corn problema

Jenna 10 celer

(Mauri) o 10 simplicities

2 car da conexas

Tempo 9 celor e 10 celos

e some staining

$$(1^{\circ} \text{ Vars}) \frac{10 \text{ infusões}}{10 \text{ celer}} = 1$$

$$(2^{\circ} \text{ Vars}) \frac{10 \text{ infusões}}{9 \text{ celer}} = 1,1$$

[Nota:

6 celos e' meno que 2 por o pipeline mestreclar
em 2 celos e depois come a engrenagem da OG. IPE no
dois celos ver infusão 2

~~Sort 16~~

	c1	2	3	4	5	6	7	8	9	10	11	12	13
--	----	---	---	---	---	---	---	---	---	----	----	----	----

SW R16 12(n6) IF ID EX MEM WB

LW R16 8 (n6) IF ID EX MEM WB

BEQ R5 R4 LBL

IF ID EX MEM WB

Add R5 R1 R4

IF ID EX MEM WB

SLT R5 R15 R4

IF ID EX MEM WB

~~Sort 16~~ (4.10.1)

Excer 6

(4.10.1)

* (-Mem-) esto mem más grande que memoria

4.10.3



(memoria - 1)

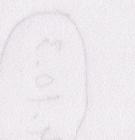
SW R16 12(n6) IF ID EX MEM WB

LW R16 8 (n6) IF ID EX MEM WB

BEQ R5 R4 LBL IF ID EX MEM WB

Add R5 R1 R4 IF ID EX MEM WB

SLT R5 R15 IF ID EX MEM WB



4.10.2

$$(n^{\circ} \text{ andares} - 1) + n^{\circ} \text{ instrucción}$$

$$3 + 5 =$$

Suma de = 8 //

4.10.3

$$(n^{\circ} \text{ andares} + 1) + n^{\circ} \text{ instrucción} + \text{stall cycles}$$

→ e/Baq No-Ex:

$$4 + 5 + (1 \times 1) = 10$$

$$\frac{11}{10} = 1.1$$

→ eon/Baq No-Ex:

$$4 + 5 + (1 \times 2) = 11$$

still
cycles

4.10.4

$$(n^{\circ} \text{ andares} - 1) + n^{\circ} \text{ instrucción}$$

$$4 + 5$$

= 9 Pedalst

Speedup = $\frac{\text{Tiempo para 5 andares}}{\text{Tiempo para 4 andares}}$

$$= \frac{9 \times 200}{8 \times 210} = 1.07 \text{ Speedup min - Cante para 5 andares}$$

$$\text{Mem } 190 \text{ Pa} \neq 20 \text{ Pa} = 210 \text{ Pa}$$

Tan. a res. a medida do motor

$$5 \text{ andares} = 1800 \text{ Pa}$$

$$4 \text{ andares} = 1680 \text{ Pa}$$

~~4.10.5~~

	e1	2	3	4	5	6	7	8	9	10	11	12	13
LW R1 O(R1)	WB												
LW R1 O(R1)	EX	MEM	WB										
Breq R1 R0 Loop	ID	X***	EX	MEM	WB								
LW R1 O (R1)	IF	X***	ID	EX	MEM	WB							
AND R1 R1 R2		IF	X***	ID	X**	EX	MEM	WB					
LW R1 O (R1)			IF	X**	ID	EX	MEM						
LW R1 O (R1)				X**	IF	ID	X**						
Breq R1 R0 Loop					IF	X**	ID						
LW													

4.10.5

~~4.18.1~~

4.18.1

4.18.1

add \$2, \$0, \$0

cld: req \$2, \$8, fin

add \$3, \$2, \$9

lw \$4, 4(\$3)

sw \$4, 4(\$3)

add \$2, \$2, 2

req \$0, \$0, cld

fin:

4.18.2

add \$2, \$0, \$0

req \$2, \$8, fin

IF ID EX MC WB

for ($i = 0, i \neq j, i \geq 2$)
 $a[i+1] = a[i]$